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3

REC'D 17 APR 1998

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I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

I also certify that the attached copy of the request for grant of a Patent (Form 1/77) bears an amendment, effected by this office, following a request by the applicant and agreed to by the Comptroller-General.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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PRIORITY DOCUMENT

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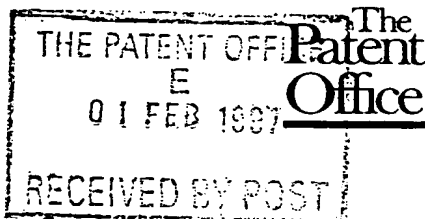
Andrew Gersey

Dated

3 March 1998

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Patents Act 1977
(Rule 16)



03FEB97 E250622-1 C13294
PD1/7700 25.00

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference

CP 185

2. Patent application number

(The Patent Office will fill in this part)

9702119.0

01 FEB 1997

3. Full name, address and postcode of the or of each applicant (underline all surnames)

WRC PLC

FRANKLAND RD

BLAGROVE

SWINDON

WILTS SN5 8YE

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

UK

5800354002

4. Title of the invention

CEMENTITIOUS COMPOSITION AND CEMENTITIOUS PRODUCT OF LOW LEACHING PROPERTIES.

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

As above

A.A. THORNTON & CO

NORTHUMBRIAN HOUSE

303-306 HIGH HOLBORN

LONDON WC1V 7LE

5/11 24/12 89

Patents ADP number (if you know it)

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

YES

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

Patents Form 1/77


9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description 3 ~~4~~


Claim(s) 2

Abstract 1

Drawing(s) 1 

10. If you are also filing any of the following, state how many against each item.

Priority documents -

Translations of priority documents - 

Statement of inventorship and right to grant of a patent (Patents Form 7/77) 1

Request for preliminary examination and search (Patents Form 9/77) -

Request for substantive examination (Patents Form 10/77) -

Any other documents (please specify) -

11. I/We request the grant of a patent on the basis of this application

Signature



Date 31.1.97

12. Name and daytime telephone number of person to contact in the United Kingdom

KAREN MCCLINTOCK

01793 511711

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

- If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.
- Write your answers in capital letters using black ink or you may type them.
- If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.
- If you have answered 'Yes' Patents Form 7/77 will need to be filed.
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- For details of the fee and ways to pay please contact the Patent Office.

CEMENTITIOUS COMPOSITION AND CEMENTITIOUS PRODUCT OF LOW LEACHING PROPERTIES

This invention relates to cementitious compositions comprising a hydraulic cement, cement replacement materials, pozzolanas and water and to cementitious products produced by the setting of these cementitious compositions; in particular, it relates to a cementitious product having low leaching properties with the primary intent of use as a coating for the internal surface of metallic drinking water pipes.

The corrosion of metals in contact with drinking water occurs by an aqueous electrochemical mechanism. This involves the presence of water (or moisture) containing dissolved ions at the metal surface, and the corresponding transfer of the electrons from the metal surface to the aqueous environment in contact with it. Corrosion protection involves interfering with these processes.

Current internal protection systems for water pipes usually consist of either cement mortars or epoxy resin polymeric coatings. The cement mortar suffers from a number of problems such as lime leaching when placed in low alkalinity and low hardness waters. This results in impaired water quality by increasing the pH, alkalinity and calcium concentrations and causes structural deterioration (poor durability) of the cement mortar. In contrast, epoxy resin can suffer from a number of problems such as water quality problems if insufficiently cured, blistering and poor coverage at pipe joints.

The invention presented here improves upon existing cement mortars and epoxy resin polymeric coatings and as such provides an improved internal corrosion protection system for metallic drinking water pipes.

According to the present invention there are provided cementitious compositions which in the hardened state act as low leaching and durable coatings in low alkalinity and low hardness waters.

A specific embodiment of the invention will now be described by way of example with reference to the accompanying drawing in which:-

Figure 1 shows the key components of the corrosion protection system, and;

Figure 2 illustrated the manufactured pipe product.

Referring to the drawing the corrosion protection system consists of a metallic substrate 2 which is coated with a low leaching and durable cementitious product 1. The system is wetted prior to the application process. The cementitious material cures in contact with the substrate and provides an alkaline environment in contact with the internal surface of the pipe. Once fully cured the cementitious product 1 protects the pipe 2 from electrochemical corrosion and also from external leaching of the cement by drinking water. The system may be applied to the surface of the pipe in a number of ways, for example, *in situ* using spray on lining equipment or in the factory using casting techniques.

In another example the cementitious product 1 would be a binary cementitious composition comprising at least one hydraulic cement and a highly reactive pozzolan of not more than thirty parts by weight of the dry mass composition.

In another example the cementitious product 1 would be a ternary cementitious composition comprising of a hydraulic cement replacement material in a proportion of not more than seventy parts by weight of the dry mass composition and a highly reactive pozzolan of not more than ten parts by weight of the dry mass composition.

In all cementitious compositions the hydraulic cement is a calcium silicate cement, the highly reactive pozzolan is metakaolin and the cement replacement materials are blast furnace slag or pulverised fuel ash or any combination of the two.

By way of another example the cementitious product 1 would be blended with sand to form a low leaching and durable cement mortar coating.

By way of another example the cementitious product 1 would be blended with aggregate to form a low leaching and durable concrete.

By way of another example the cementitious product 1 could contain fibre reinforcement to form a low leaching and durable cementitious structural coatings.

CLAIMS

- 1 A cementitious composition which in the hardened state acts as a low leaching and durable coating in low alkalinity and low hardness waters.
- 2 A cementitious composition as claimed in claim 1 comprising (a) at least one hydraulic cement and (b) highly reactive pozzolan of not more than thirty parts by weight of the dry mass composition.
- 3 A cementitious composition as claimed in claim 1 comprising (a) at least one hydraulic cement (b) cement replacement material in a proportion of not more than seventy parts by weight of the dry mass composition and (c) highly reactive pozzolan of not more than ten parts by weight of the dry mass composition.
- 4 A cementitious composition as claimed in claims 1 to 3 when mixed with sand to form a cementitious mortar composition.
- 5 A cementitious composition as claimed in claims 1 to 4 characterised in that the hydraulic cement is a calcium silicate cement.
- 6 A cementitious composition as claimed in claims 1 to 5 characterised in that the pozzolan is metakaolin.
- 7 A cementitious composition as claimed in claim 1 and claims 3 to 6 characterised in that the cement replacement material is activated blast furnace slag.
- 8 A cementitious composition as claimed in claim 1 and claims 3 to 6 characterised in that the cement replacement material is pulverised fuel ash.

- 9 A cementitious composition as claimed in any one of claims 1 to 8 characterised that the composition contains not more than 50% by weight of water.
- 10A cementitious composition as claimed in any one of claims 1 to 9 characterised in that the composition contains particular aggregate.
- 11A cementitious composition as claimed in any one of claims 1 to 10 characterised in that the composition contains fibre reinforcement.
- 12A cementitious product produced by setting of a cementitious composition as claimed in any one of claims 1 to 11.
- 13A corrosion protection system consisting of a chemically and physically modified cement as claimed in claims 1 to 12.
- 14A system as claimed in claims 1 to 13 that can be applied to the internal surface of a drinking water pipe.

ABSTRACT**CEMENTITIOUS COMPOSITION AND CEMENTITIOUS PRODUCT OF LOW
LEACHING PROPERTIES**

A range of cementitious compositions which in the hardened state act as low leaching and durable coatings in low alkalinity and low hardness waters. The coatings can be applied as either low leaching and durable cement pastes or when blended with sand as low leaching and durable cement mortars. The cementitious compositions comprise a hydraulic calcium silicate cement, cement replacement materials such as blast furnace slag and pulverised fuel ash, the pozzolan metakaolin and water. The cementitious products produced by the setting of these cementitious compositions form low leaching and durable coatings which can be applied to metallic substrates such as the internal surface of drinking water pipes.

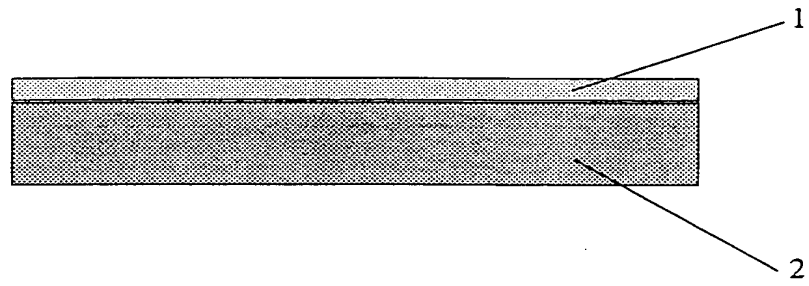


Figure 1

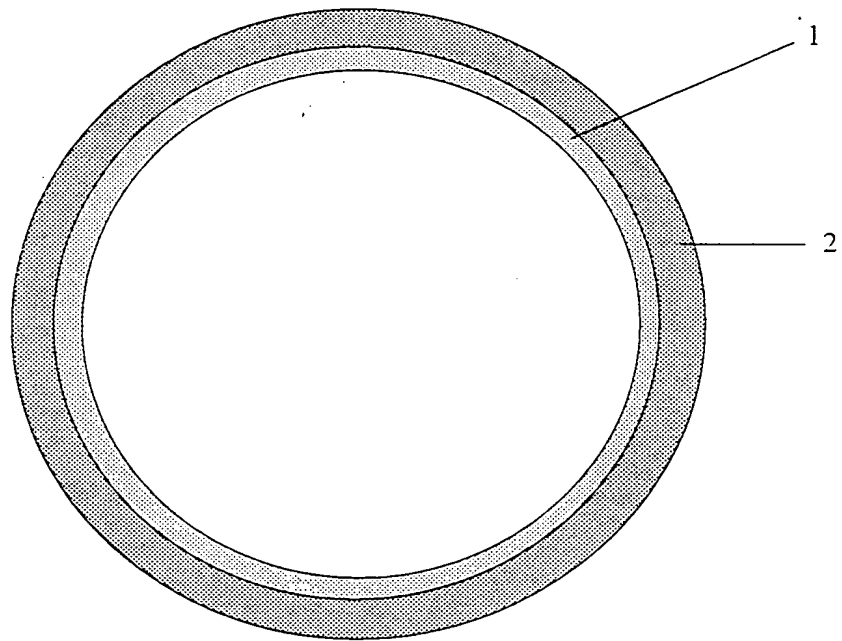


Figure 2

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